

ENTRY NO. C 42 **Date** September 1995
Name of Machine MINI-CYCLOTRON ILEC
Institution Eindhoven University of Technology (EUT)
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In Charge: J.A. van der Heide **Reported by:** J.A. van der Heide

HISTORY
MILESTONE DATES:
 Design 1982 Model Tests 1986
 Construction 1985-1988 First Beam 1989
DESIGN/CONSTRUCTION BY:
 in house yes other no
COST: Accelerator DFL 400.000 **Facility** DFL 500.000
FUNDED BY: University

STATUS
STAFF: Machine
 Scientists 1 Engineers 1
 Technicians 1 Students 2
 Research (in house/external)
 Scientists / Engineers /
 Technicians / Students /
BUDGET: Machine DFL 20.000 **Funded by** EUT
 Research Funded by
TIME DISTRIBUTION:
 Basic Research (in house/external) % / %
 Applied Program (in house/external) 25 % / %
 Maintenance 25 % Development 50 %

MAGNET
POLE PARAMETERS:
 Diameter 20 cm $R_{extract}$ 16.7 cm R_{inject} cm
HILL PARAMETERS: Gap (min) 3.3 cm B_{max} 1.8 T
 (@ AT) Gap (max) cm B_{min} T
VALLEY PARAMETERS: Gap (min) 5.0 cm B_{max} 1.2 T
 (@ AT) Gap (max) cm B_{min} T
AVERAGE FIELD: $\langle B \rangle_{min}$ 1.43 T $\langle B \rangle_{max}$ 1.43 T
NUMBER OF SECTORS: compact/separated 4 /
 sector angle 40° hill deg. spiral (max) 0 deg.
FIELD TRIMMING: Trim Coils no circular
 Harmonic Coils 4 sets
 Other
CURRENT: Main Coils 140 Amps Stability 10^{-5}
 Trim Coils 20 Amps Stability 10^{-4}
 Stored Energy (cryogenic) MJ
WEIGHT: Iron 2.8 tons Conductor 0.25 ton
ION ENERGY: Bending Limit E/A = 3 q²/A² MeV/u
 Focusing Limit E/A = q/A MeV/u

ACCELERATION SYSTEM
FUNDAMENTAL ACCELERATION:
 Description: 2nd harmonic dees
 No. of Gaps/turn 4 dE/dn(max) 0.080 MeV/q
 Voltage (max) 0.028 MV Harmonic f_r/f_{ion} 2
 Freq 43.5 MHz Power in(max) 0.014 MW
 Stability: Phase 0.2° Voltage 10^{-4}
OTHER CAVITIES (Flattopping or otherwise):
 Description: two sixth harmonic flattop dees
 Region of Influence: R_{min} 5.5 cm R_{max} 16.7 cm
 No. of Gaps/turn 4 dE/dn(max) 0.012 MeV/q
 Voltage (max) 0.003 MV Harmonic f_r/f_{ion} 6
 Freq 130.5 MHz Power in(max) 0.0002 MW
 Stability: Phase 0.7° Voltage 10^{-4}

VACUUM SYSTEM
OPERATING PRESSURE: 10^{-5} Torr
PUMPS (No. and type) 1 oil diffusion pump
 3000 l s⁻¹

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a) Internal	3		protons
(b)			
(c)			
(d)			

INJECTION SYSTEM Efficiency %

EXTRACTION SYSTEM
 Electrostatic and passive magnetic Efficiency 50 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μ A)	
		Internal	External
(a) protons	2.9	60	30
(b)			
(c)			
(d)			

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:
 For μ A of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ °
 $\epsilon_n = \beta\gamma\epsilon$ x π mm mrad z π mm mrad

FACILITIES FOR RESEARCH
SHIELDED AREA: Fixed 30 m² Moveable 60 m²
 Target Stations: 3 No. Served At Same Time: 1
MAGNETIC SPECTROMETERS:
OTHER FACILITIES:

REFERENCES/NOTES
 (a) J.A. van der Heide, e.a. Nucl. Instr. & Meth. A240 (1985) 32-35 and J.A. van der Heide e.a. Nucl. Instr. & Meth. B64 (1992) 336-341

PLAN VIEW OF FACILITY, COMMENTS
 The pole faces are copper plated to form grounded parts of the RF circuit.

